



# Using a school-based approach to deliver immunization—Global update



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## ABSTRACT

Vaccines, such as HPV vaccine, are increasingly administered to school-age children, and school-based immunization is an approach that can be used to reach these children. Limited information has thus far been published that provides an overview of the school-based approach worldwide. This article, based on self-reported data from countries, summarizes the extent to which a school-based immunization approach is used around the world, and what antigens are most frequently being administered. Of the 174 countries for which data on school-based immunization were available, ninety five countries reported using a school-based approach for immunization. Children in grades 1 and 6 (or at an age corresponding with these grades) are most often targeted, and tetanus and diphtheria toxoids are the most frequently administered antigens. The impact of the school-based approach may be reduced in areas with low school attendance, unless specific measures are taken to target out-of-school children. Methods to monitor coverage need to be standardized and data on coverage and on the reach of the approach need to be more systematically analyzed and reported.

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## 1. Background

Immunizations have been utilized in pediatric preventive care for decades, especially for infectious disease prevention in infants and young children. These immunizations avert an “estimated 2 to 3 million deaths every year from diphtheria, tetanus, pertussis (whooping cough), and measles” [1]. Since the Expanded Program on Immunization (EPI) was established in 1974, the immunization schedule recommended by the World Health Organization (WHO) was for 6 antigens, all to be administered in the first year of life and (for tetanus toxoid) to pregnant women. In recent years, as newer vaccines, stronger delivery systems and more data on the need for boosters have become available, WHO has regularly revised the recommended schedule. WHO currently recommends [2] up to 12 antigens for global use, and at least one dose of tetanus and diphtheria toxoids and multiple doses of HPV vaccines for school-aged children (and under certain circumstances, rubella vaccine). Another 10 antigens are recommended for special or regional use, of which 6 may require a dose during school-age. Additional vaccines in adolescence are recommended for some high risk groups.

Whereas all countries have a well-established immunization program targeting infants or young children, and adult women, the strategies to reach school-aged children vary [3]. A school-based approach, i.e. taking advantage of school attendance to immunize children with the school as a delivery venue, has the advantages that the target group of school-aged children (at least the ones attending school) can easily be reached, while minimizing logistical and time constraints. School-based approaches have been successfully used to deliver other adolescent-targeted health care interventions, but can also pose problems in terms of equity, especially where large numbers of children do not attend school [4].

MacKroth et al. previously described the extent to which school-based immunization is used, based on an e-mail survey, representing 143 countries [3]. The current study, using a well-established official reporting format, provides a more extensive, systematic and recent view, on the use of school-based approaches for administering routine immunization to school-aged children. It also summarizes data on antigens administered under the approach.

## 2. Methods

Every year since 1998, UNICEF and WHO collect a set of immunization-related data through the “WHO-UNICEF Joint Reporting Form (JRF)”, which is completed once a year by Ministries

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of Health in all Member States [5]. Since 2009, the data set includes basic data on whether a school-based approach is used in a country, what vaccines are being given at what grade and to what age groups, the sex of the children targeted, as well as some additional questions. Countries are asked whether “routine immunization is given to school-aged children using the school as a venue” and should include only “doses that are given as part of the national immunization schedule”, i.e. excluding campaigns. This dataset on school-based immunization, which has only been published after preparation of this manuscript, was used as basis for this analysis. The data were extracted from a database and entered in an excel spreadsheet. Only data for 2012 were taken into account. Data entries that seemed to be errors were not used, unless triangulation with other data sources, such as data on the reported immunization schedule, provided clarification. In instances where no school grade was given for the targeted population, the most likely grade corresponding to age was used for this analysis. In instances where one dose of a vaccine was administered across a number of grades, the midpoint of the grades was used for analysis. For classification by WHO region, GAVI-eligibility and World Bank income level, relevant classifications were used as published by each of these agencies respectively [6–8]. When countries reported combination vaccine use (e.g. MMR (Measles, Mumps, Rubella)), the analysis was done using the individual antigens contained in these vaccines (e.g. Measles, Mumps, Rubella vaccine).

### 3. Findings

Of the 195 countries and territories that had been requested to complete the JRF report in 2013 (reporting 2012 data), 189 submitted a JRF form, of which 174 included information on whether a school-based approach was used in their country as of 2012. Of these, 95 answered positively, while 79 said no school-based approach was being used for immunization services. Out of the 95 countries, 90 countries provided further details on the school-based immunization approach (see Table 1 and Fig. 1)

In 2012, school-based immunization was used more in higher-income countries: 64% of high income or higher middle income countries reported the existence of a school-based immunization program, against 28% of lower and lower middle income countries (as per World Bank Classification [6]). Only 10 of 50 (20%) responding GAVI<sup>1</sup> eligible countries, and 8 of 13 (62%) responding GAVI graduating countries [8] reported using a school-based approach to deliver vaccines. School-based immunization was most used in the WHO Region of the Americas [7] with 27 countries responding positively (79% of countries in the Americas for which information on school-based immunization was available), and least in the African and the South-East Asian Regions, with 11 and 3 countries respectively (i.e. 27% of countries in each of these regions). In the Eastern Mediterranean, the European and the Western-Pacific Region, the number of countries was 14 (64%), 23 (58%) and 17 (65%) respectively.

In total, 18 different antigens were given through a school-based approach between all countries and all grades.

Most countries provided more than one antigen using a school-based approach, often using combination vaccines. Only 13 countries just gave one antigen, while at the other extreme

<sup>1</sup> Gavi, the Vaccine Alliance, brings together public and private sectors with the shared goal of creating equal access to vaccines for children, wherever they live. Its mission is saving children's lives and protecting people's health by increasing access to immunization in poor countries. Countries with a GNI per capita below US\$ 1500 (2009 World Bank data – to be adjusted for inflation) are eligible for support. Countries that were previously eligible, but whose per capita income subsequently increased beyond the threshold are considered “graduating”.

3 countries gave 10 different antigens. Fig. 2 summarizes the frequency at which countries gave *different* antigens using a school-based approach. Information on antigens was only available for 90 countries.

Tetanus toxoid (TT)-containing vaccine was the most commonly used antigen in the school-based approach: 80 countries provided TT-containing vaccine, of which 30 countries gave 1 dose, 43 countries gave 2 doses and 7 countries gave 3 doses. Of the other antigens recommended by WHO to be administered to school-aged children, diphtheria was given in 72, rubella in 39, and human papilloma virus (HPV) in 20 countries. Many countries provided vaccines against measles (41), polio (38), mumps (36), and pertussis (28). Hepatitis A, influenza, rotavirus and typhoid vaccines were the least used antigens (1 country each) (Fig. 3). In many instances antigens were administered by using combination presentations (e.g. MMR or Tetanus-Diphtheria (Td)).

Primary school was most frequently used to deliver vaccines, with grades 1 and grade 6 being the grades when most vaccines were given. Fig. 4 shows the distribution of antigens by grade. In each grade, tetanus toxoid was the most frequently used antigen.

Most vaccines were given to both boys and girls. In countries where the HPV vaccine was administered through schools, it was given to girls only. In addition, in 6 countries TT/Td, and in 2 countries rubella-containing vaccine were given to girls only.

In 78 countries, all school-based vaccines were offered nationwide, while in 3 countries they were only offered in part of the country. In 9 countries, some vaccines were given nationwide, while others were given in parts of the country only. For 5 countries, no such data were available.

In 190 instances, data were available on the size of the targeted population and the number of the children reached. Coverage-calculated in percentage as the number of children immunized divided by the number of children targeted – for these 190 instances was high: in 111 (58%) instances coverage was reported to be 90% or above, and only in 25 (13%) it was 50% or below.

In the vast majority of countries, it was the Immunization Program that was responsible for various aspects of the school-based immunization: in 84 (92%) countries it was responsible for planning, in 88 (96%) countries for vaccine procurement, in 77 (85%) countries for the provision of vaccinators, and in 81 (89%) countries for supervision of the program.

In 77 countries, school-based immunization was part of a larger school health program, while in 13 countries it was not (no data from 5 countries). Twenty seven countries reported on interventions given together with the vaccine, which frequently were physical check-ups, height/weight measurement, dental checks, vision checks, deworming, and/or health education. Doses given in a school-based approach were recorded on an immunization card in 64 countries, not registered in 5 countries, and 26 countries did not provide information.

### 4. Discussion

As of 2012, 95 countries reported to have implemented the administration of at least one dose of a vaccine using a school-based approach, while 79 countries explicitly stated not to have such an approach. School-based immunization was least frequently used in countries that are ranked as low or lower-middle income.

As published elsewhere [9], in the period 2007/2008–2011 school enrollment and attendance<sup>2</sup> rates were high in primary

<sup>2</sup> Primary school net enrolment ratio is the number of children enrolled in primary or secondary school who are of official primary school age, expressed as a percentage of the total number of children of official primary school age. Primary school net attendance ratio is the number of children attending primary

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